Lower Willamette Group (LWG) Reponses to EPA's February 15th, 2008 Comments on the Draft Treatability Study Literature Survey Technical Memorandum – All Responses, March 28, 2008

This document includes LWG responses to EPA's comments on the Draft Treatability Study Literature Survey Technical Memorandum dated October 20th, 2007.

General Response: Many of the comments call for revisions to the Treatability Study Literature Review. The Programmatic Work Plan indicates that if the literature review finds that treatability studies are not needed, viable treatment technologies (as determined by the literature review and EPA comments) will be considered in the Refinement of General Response Actions (GRAs) step of the FS. EPA's comments indicate that there is not a need for treatability studies at this time, and this is in general agreement with the LWG's findings. However, in some cases either the LWG and/or EPA has called for additional evaluations of existing information relating to several treatment technologies. Consequently, we propose that the LWG prepare an additional document "Additional Evaluation Treatment Technologies Technical Memorandum" (AETT) consistent with our detailed responses below. This document would identify the LWG's proposed final list of treatment technologies for use in the FS taking into consideration EPA's comments. We believe this next step would better expedite the project and prepare us for start of the FS as compared to revision of the existing draft Literature Survey.

In other cases, the comments focus on issues that will be directly addressed in the FS. The detailed responses below identify in which document, either the AETT and/or the FS, that the each comment will be addressed by the LWG.

Comment 1 General Comments: It should be recognized that the state of sediment treatment is evolving and will continue to evolve until sediment remedies are evaluated and implemented at the Portland Harbor site. In addition, the consideration of sediment treatment has been identified as a key issue by the Portland Harbor Community Advisory Group (CAG). As a result, it is critical that sediment treatment options receive a thorough and rigorous evaluation recognizing that treatment costs can be off-set by beneficial re-use of contaminated sediments post treatment.

Response: The LWG agrees that sediment treatment options should receive a rigorous evaluation in the FS process. As called for in Section 8 of this document, the proposed AETT document will further address potential cost off-sets of beneficial reuse. It should be noted that a full cost analysis cannot be completed until remedial action levels or at least Preliminary Remediation Goals (PRGs) are established for the project. Technologies that pass through this additional evaluation will be evaluated in the FS.

Comment 2 General Comments: The initial evaluation of treatment technologies should focus primarily on cost and effectiveness at this point. Siting and permitting challenges should not be used as screening criteria at this time. Although EPA recognizes that

permitting and siting may result in significant challenges, if the technology is effective and cost competitive, it will be in everyone's interest to overcome these permitting and siting challenges.

Response: The LWG agrees to not screen out those treatment technologies that were judged as "unlikely" solely based on implementability issues, except where those issues directly impact cost. Such technologies will be recategorized in the proposed AETT document and be evaluated in the FS.

Comment 3 General Comments: Overall the Treatability Study Literature Survey presented a comprehensive overview of the "world" of sediment treatment categories and parallel technologies that have undergone bench through commercial scale applications. The literature review covers a wide chronology from the early 1990's to 2006. However, it should be noted that that much of the published work goes back years before the actual publication date. Pilot and full-scale demonstrations of sediment treatment processes (both standard such as dewatering and stabilization/solidification as well as innovative treatment processes) have been progressing over the last 3 years. However some of this recent work has not been reported in literature since it could be part of a private client project, or a larger programmatic federal/state demonstrations currently evolving as more full/commercial scale demonstrations / remediation projects collecting data for regulatory and geotechnical requirements. The Treatability Study Literature Survey should identify, summarize and evaluate the application of treatment technologies at some of these more recent projects.

Response: It is difficult to identify more recent work that has not been published or described to a wider audience. If there are specific projects that EPA would like the LWG to research and interview people involved, the LWG can do that for the AETT document. Without some more specific information, we are not readily able to comply with this comment. Where detailed comments below identify specific projects or information not considered, we will incorporate that into the AETT document as specified in detailed responses below.

Comment 4 General Comments: The Portland Harbor feasibility study (FS) and evaluation of treatment options should consider the concept of net risk reduction. EPA's Contaminated Sediment Remediation Guidance for Hazardous Waste Sites EPA describes "net risk reduction" as a method to ensure that all positive & negative aspects of each sediment management approach are considered at contaminated sediment sites. Net risk reduction considers not only the overall risk reduction offered by different remedial action alternatives, but also risks introduced by implementing the remedy. Treatment of contaminated sediments – whether in conjunction with sediment removal or not – can provide long term risk reduction that should be factored into the analysis of net risk reduction.

Response: The LWG intends that the FS evaluation of all technologies and remedial alternatives will be consistent with the guidance and the concept of net risk reduction, including treatment technologies.

Comment 5 General Comments: EPA recognizes that the standard sediment remediation technologies are generally the most proven and cost effective. These technologies include: 1) Dredging and the subsequent disposal and placement options - nearshore confined disposal facilities (CDFs), confined aquatic disposal (CADs) and upland disposal with or without pretreatment such as stabilization; 2) capping and 3) monitored natural recovery. However, further consideration should be given to hybridization of sediment remediation and treatment options to address multiple contaminants and integration into long-term regional sediment management (including beneficial use).

Response: We agree that remedial technologies should be addressed in combination in the FS. The FS will address this during the assembly of treatment technologies into comprehensive remediation alternatives that include other remedial technologies such as dredging, disposal, and capping. Thus, "hybridization" of treatment with other technologies will be fully considered in the FS.

Comment 6 General Comments: It should be noted that due to the scale of the Portland Harbor RI/FS, significant quantities of contaminated sediment will require management. These sediments (perhaps in conjunction with dredging projects being contemplated by the U.S. Army Corps of Engineers or at specific facilities) may create some economies of scale for treatment and beneficial re-use of contaminated sediments. The treatment train process which includes up-front materials handling should be a significant factor in decision making of the alternatives. This has proven over and over to be more of an economic factor to a project than the process choice itself.

Response: We agree that up front material handling issues need to be addressed in the FS, consistent with a comprehensive evaluation of all technologies. The FS will consider the extent to which treatment technologies may become more economically viable if large quantities of sediment are removed. It is unlikely that most maintenance dredging activities will generate additional large quantities of contaminated sediments appropriate for treatment, but to the extent that these projects have been identified in areas of substantially contaminated sediments, this can also be factored into the FS estimate of dredge volumes.

Comment 7 Section 2.2 – Initial Areas of Potential Concern, p. 3: It should be noted that EPA has identified additional iAOPCs beyond those identified in the Round 2 Report.

Response: We acknowledge that EPA has identified additional iAOPCs. Per the document, we are using the Round 2 Report iAOPCs in a preliminary way to help identify potentially viable treatment technologies and will use them again in the AETT

document. AOPCs will be developed in coordination with EPA at the start of the FS process.

Comment 8 Section 2.2 – Initial Areas of Potential Concern, p. 3: Although a number of early action sites have been identified, the timing of remedial actions at these sites is currently unclear.

Response: We agree with the EPA comment.

Comment 9 Section 5.1.1 – Passive Dewatering, p. 8: The Treatability Study Literature Survey identifies the use of geotextile tubes as a passive dewatering device. This technology has been applied recently at the Ashtabula River in Ohio. Information from the implementation of the Ashtabula dredging project managed by the EPA Great Lakes National Program Office should be consulted to better assess the applicability of geotextile tubes at the Portland Harbor site.

Response: This additional information and further evaluation of geotubes will be conducted for the AETT.

Comment 10 Section 5.3.3 – Stabilization/Solidification, p. 12: The cost of Portland cement for stabilization/solidification is not trivial and is increasing per ton of cement. Current costs for stabilization/solidification with Portland Cement are approximately $100/ton. Stabilization/Solidification processing of NY/NJ harbor sediments is approximately $55-65 cubic yard when used as geotechnical fill for brownfields and sub-base for golf course construction. Clearly, beneficial re-use is one way to reduce unit costs associated with stabilization/solidification.

Response: Per response to Comment 1, the LWG will further evaluate beneficial reuse cost offsets in the AETT.

Comment 11 Section 5.4.3 – Thermal Desorption, p. 16: The Upcycle lightweight aggregate (LWA) process did not continue its pilot-scale test at the Bayshore Recycling facility in Keasby, NJ. However, there is no reason to believe that lightweight aggregate could not be a viable process with a high value beneficial use product. The concept behind Upcycle though was to utilize existing LWA kilns using a sediment feedstock that would be dewatered and pelletized before *feeding* the kiln.

Response: We acknowledge the additional information provided. It will be considered in the AETT document.

Comment 12 Section 5.4.4 – Vitrification, p. 17: It should be noted that the Bayshore Recycling facility is not a regional sediment decontamination facility. The Bayshore Recycling facility was used as an up front materials handling platform utilizing a Great Lakes ore/grain carrier for a sediment hold. The material was pumped out of the ship across a dock into a large warehouse building that housed the BioGenesis sediment washing process. Approximately 14,000 cubic yards of sediment was dredged and processed from the Raritan River, NJ, Arthur Kill federal navigation channel and the Passaic River, NJ Superfund site as part of a dredging pilot (Passaic River) and full-scale sediment decontamination demonstration (2005-2007). BioGenesis dewatered sediment for GTI (Gas Technology Institute) Cement-Lock process utilizing a plate-frame filter press which was part of their liquid/solid separation process. GTI conducted their demonstration of their thermo-chemical process at the IMTT Facility in Bayonne, NJ using a 10,000 cubic yard/yr demonstration kiln.

Response: We acknowledge the additional information provided. It will be considered in the AETT document.

Comment 13 Section 5.4.4 – Vitrification, p. 17: The Treatability Study Literature Survey states on page 18 that the "downside to this [vitrification] technology is that the process requires significant electrical energy (or natural gas in the GTI case) and thus costs significantly…" It should be noted that high temperature systems have evolved into waste to energy – gasification, heat recovery – electrical generation designs that over time could be cost effective with manufacturing of a high value beneficial use product (construction grade cement, light weight aggregate etc).

Response: We acknowledge the additional information provided. It will be considered in the AETT document.

Comment 14 Section 5.5 – Summary, p. 18: It should be noted that the BioGenesis sediment washing and GTI Cement-Lock process are in the process of submitting draft-final reports from their full-scale demonstration efforts (2006-2007). Both processes are included in the USEPA Passaic River Superfund Focused Feasibility Study (www.ourpassaic.org) as components to hybrid remedial options. Technical memorandums and preliminary results including costs are included in this study. In addition, the USACE ERDC Vicksburg is in the process of developing a report on the "State of the Art of Treatment Technologies" – they are focusing on ex-situ technologies with beneficial use applications. This deliverable will include mass balance and economic projections. Trudy Estes is the principal investigator on this effort.

Response: We will evaluate the additional information noted in the comment and consider it in the AETT document.

Comment 15 Section 6.0 - In-Situ Treatment, p. 19: It should be noted that Rutgers University (Ali Maher) and Raito, Inc conducted deep sediment mixing at a site in Newark Bay, NJ under work sponsored by the NJ DOT. A report on this effort is on the NJDOT Office of Maritime Resources website.

Response: We will evaluate the additional information noted in the comment and consider it in the AETT document.

Comment 16 Section 7.0 – Evaluation of Treatment Technologies, p. 27: More successful processes have looked at the treatment train concept of materials handling, technology development, and beneficial use applications. Price structures based on available data today range between $65 – 150 per cubic yards. Treatment technologies should be evaluated not as stand alone options but rather as part of an integrated approach to sediment management that considers treatment trains and beneficial re-use. From a programmatic cross-integration perspective, this may include both navigational and Superfund sediments which are critical to accomplish enough flow-through capacity for these technologies to succeed economically on a large scale over the long term. Other programs that may benefit from sediment treatment technologies include brownfield cleanups (soils, sediments, and demolition and construction debris). Integration of technologies as part of a multi-media regional processing facility could provide long-term sustainable infrastructure in conjunction with CDFs to provide active storage capacity to make these facilities renewable and to manufacture beneficial use products.

Response: We disagree that Section 7 evaluates treatment technologies as "stand alone" options. The issues of scale and its impact on costs as well as beneficial reuse are considered in the document. However, because this document is intended as an initial screening of treatment technologies, it is not a full or detailed evaluation of these issues. Our approach (consistent with the Work Plan) is to preliminarily evaluate all treatment technologies on a consistent basis and subsequently in the FS evaluate more promising technologies on a site-wide basis as described in the comment. This more complete evaluation will be conducted in the FS. The comment also mentions evaluating other potential sources of contaminated material outside the project. Given that we have no control over those other projects, it is beyond the scope of the FS to fully evaluate a regional treatment facility from multiple projects. However, as noted in a previous response, to the extent that these other projects are identified by others (at sufficient level of detail) they can be considered in the economies of scale potentially available for treatment technologies in the FS.

Comment 17 Section 7.2 – Treatment Volume Estimate, p. 28: The referenced text states that beneficial use evaluation of treated and untreated sediment options are not part of this literature review and will be considered in the FS on a case-by-case basis. EPA believes that beneficial re-use of treated dredge sediment should be considered in cost estimates for the general evaluation of technologies. Furthermore, it would be helpful to

include an initial market survey for potential "beneficial uses" of treated and untreated excavated sediment (e.g., any chance of using sediment in building or road-bed materials in the Portland area, etc.).

Response: Per response to Comment 1, we agree to include a preliminary evaluation of off-set costs of beneficial reuse in AETT document. A more detailed estimate of potential offsets can be included in the FS for those technologies that screen through. However, we believe at this point in the project (and even for the FS) is it sufficient to identify potential offset costs on a general basis rather than specific sites, projects, or programs that may exist to accept such materials. A detailed market survey would be a complex undertaking, and given the likely time span before the remedial action phase, would be speculative about the markets occurring in the future.

Comment 18 Section 7.2.1 – Upland Values for Screening, p. 30: EPA generally agrees with the strategy of defining upland screening values for dredged sediment, but have several concerns (Addressed individually in Comments 18 through 21):

Concern 1: The only screening values the LWG considered were those based on protection of human health. If there is a current or reasonably likely future chance of terrestrial ecological receptors being exposed to the dredge sediment placed in an upland facility, then toxicity eco screening level values would need to be considered. DEQ considers soil to terrestrial eco receptor to be a potentially complete & possibly important exposure pathway (mainly thru ingestion or diet), however, DEQ does not currently have bioaccumulation screening values for this pathway. Placing a strongly bioaccumulative contaminant in an upland facility may require consideration of this pathway.

Response: We can agree to also including screening levels for ecological pathways that are relevant to the purpose of screening being conducted. As noted in the document, we intend to refine this screening in the FS and will explore further potentially relevant ecological screening values at that time.

Comment 19 Section 7.2.1 – Upland Values for Screening, p. 30: EPA generally agrees with the strategy of defining upland screening values for dredged sediment, but have several concerns (Addressed individually in Comments 18 through 21):

Concern 2: The evaluation of treatment technologies should also consider the potential use of in-water or nearshore disposal in a CAD or CDF, or as fill material for Ross Island. Treatment could reduce contaminant levels, bioavailability, leachability etc., sufficient to make these disposal options viable for otherwise unacceptable material. Screening values for dredged sediment for in-water or nearshore disposal should be developed and used in addition to the screening levels for upland disposal.

Response: The EPA concern appears to misunderstand the purpose of the screen. The screen is intended to identify volumes of sediments that are likely candidates for

treatment technologies. Screening levels for in-water disposal will be lower than upland screening levels in the vast majority of cases. By definition, sediment volumes with chemical concentrations between these two levels will be suitable for upland disposal without treatment, thus reducing the potential viability of treatment under any scenario. A screen is only valuable to the extent that it screens something out, and in-water based disposal screening values are unlikely to do this because they will be similar to the aquatic risk-based levels used to identify contaminated sediments in the project risk assessment. However, we agree that the FS should consider the extent to which combinations of treatment and disposal options may be feasible (using all the criteria in the CERCLA process). Thus, to the extent that treatment and subsequent in-water disposal of sediments is more cost-effective and feasible than other options (such as in-water disposal with no treatment and more robust isolation barriers) it would be a potentially preferred alternative in the FS.

Comment 20 Section 7.2.1 – Upland Values for Screening, p. 30: EPA generally agrees with the strategy of defining upland screening values for dredged sediment, but have several concerns (Addressed individually in Comments 18 through 21):

Concern 3: The referenced text states the upland values for screening were selected from DEQ's "most restrictive ODEQ residential upland soil cleanup risk-based concentrations" (p.30) that are based on direct contact with soil. DEQ's Risk-Based Decision Making (RBDM) Guidance considers several human health exposure pathways, & generally, the direct contact with soil pathway lists the most conservative screening value. However, for naphthalene, the most conservative soil screening value is for the leaching to groundwater pathway. This soil leaching to groundwater pathway lists a screening level value of 3.8mg/kg. The LWG used the direct contact screening level of 34mg/kg in their tech memo.

Response: For future screens in the FS, as described in previous comment responses, we agree to compare all pathway screening levels to make sure the lowest value is selected across all pathways.

Comment 21 Section 7.2.1 – Upland Values for Screening, p. 30: EPA generally agrees with the strategy of defining upland screening values for dredged sediment, but have several concerns (Addressed individually in Comments 18 through 21):

Concern 4: The document describes additional consideration for PCB-bearing sediments, including DEQ's PCB Generic Remedy guidance. The LWG's tech memo cites upland generic-remedy soil values for PCBs of 1.2mg/kg (residential) & 7.5mg.kg (industrial). The literature review states that DEQ guidance is not directly applicable to the upland disposal of dredge sediment, and that the generic-remedy soil values are presented to simply provide insight. However, the literature review fails to mention that DEQ's PCB Generic Remedy guidance states these generic-remedy soil values apply only where

PCBs are the main risk driver, not in a mixture of other risk-driving hazardous substances.

Response: This additional information will be included in refined screens conducted in the FS, as described in previous responses.

Comment 22 Section 8 – Final Evaluation and Treatability Study Recommendations, p. 33: As mentioned above in the general comments, *The Probability of Further Evaluation and Consideration for Evaluation in FS* choices for "Very Likely" are fairly obvious within the "world" of alternatives. Optimization of test/project sediment for physical characteristics, chemistry, etc under bench-scale conditions are routine. What was somewhat surprising was the "Very Likely" rating for Asphalt Emulsion. Though it was mentioned that the process has been proven for soils, (NJDEP Division of Science and Research conducted a pilot in 1998 for soils) it's still from what appears to be under bench-scale development for contaminated sediments with organic and inorganic constituents.

Response: We agree with the comment and will consider this additional information in the AETT document.

Comment 23 Section 8 **–** Final Evaluation and Treatability Study Recommendations, p. 33: Innovative sediment treatment technologies with beneficial use applications has evolved over the last several years. As more demonstration tests have been completed on pilot and full-scale equipment, more environmental and process data (residual management) has been collected that fulfills regulatory and permitting mandates. Economic data today is also more realistic and critical to commercial-scale process design and especially to venture capitalists who would invest in innovative technologies.

EPA agrees that the technologies likely to move forward into the FS are generally conducted in combination with other technologies or have potential beneficial uses combined with low process costs. As a result, it is critical that the feasibility study consider beneficial use cost off-sets.

Response: Per previous responses, we will include a general assessment of beneficial reuse cost offsets first in the AETT document (at a preliminary level) and also in the FS (at a more detailed level).

Comment 24 Section 8 **–** Final Evaluation and Treatability Study Recommendations, p. 33: The Literature Review states that the technologies being carried forward are generally proven and treatability studies are not warranted to support the FS. EPA does not see the need for treatability studies for those technologies at this time. In the absence of site specific treatability studies, the Portland Harbor FS must assume that these proven treatment technologies will be effective. Further discussion is required to determine how

pilot scale evaluations and the assessment of more generic technologies (e.g., solidification/stabilization and capping amendments) will be considered in the FS and remedial design.

Response: We disagree with the premise that because treatability studies will not be conducted, that the FS must assume they are all equally effective. The absence of a treatability study does not mean there is an absence of information on the effectiveness of the technology. For the same reason, we will not assume that all treatment technologies are equally costly or equally feasible. A clear example of this would be a technology that targets certain chemicals, where it would be misleading to assume it is equally effective as a technology that addresses multiple chemicals present in the same sediments.

We agree to discuss more with EPA how existing information at various levels of detail (e.g., pilot scale vs. generic) should be consistently evaluated in the FS.

Comment 25 Section 8 **–** Final Evaluation and Treatability Study Recommendations, p. 33: The report recommends further investigation of the costs associated with technologies assessed as "unlikely" but with the potential to become economically viable (e.g. ex situ biological and physical/chemical methods). The report notes that the information would be used to determine the likelihood of carrying these technologies forward in a detailed FS evaluation and, if so, treatability testing of the technologies in late 2008 may be warranted. A proposal should be developed to conduct the additional investigation, including other factors to consider in addition to cost, so that treatability testing could be initiated in 2008 if appropriate.

Response: We agree that this additional investigation of costs should be conducted, and in our view, is the primary purpose of the AETT document we have proposed. We continue to believe that treatability studies are unlikely to be needed for the FS, but agree the AETT document should be prepared as soon as possible.

Comment 26 Table 1 – Summary and Evaluation of Ex Situ Treatment Technologies: It is unclear why sorbent clay solidification/stabilization is ranked as very unlikely. It is proven at the bench scale. Demonstrated effectiveness is moderate to high and cost is ranked as moderate.

Response: We will reevaluate our assessment of this technology in the AETT document. If after the reevaluation we disagree with the comment, a more detailed rationale for that particular finding will be provided.

Comment 27 Table 1 – Summary and Evaluation of Ex Situ Treatment Technologies: It appears premature to eliminate ex-situ chemox. This technology is widely used in the wastewater treatment field and could be implemented as part of a treatment train.

Response: We will reevaluate our assessment of this technology in the AETT document. If after the reevaluation we disagree with the comment, a more detailed rationale for that particular finding will be provided.

Comment 28 Table 1 – Summary and Evaluation of Ex Situ Treatment Technologies: It is unclear why sediment washing is ranked as very unlikely. It is demonstrated as limited full scale.

Response: We will reevaluate our assessment of this technology in the AETT document. This reassessment would benefit from any information EPA could provide regarding projects where EPA thinks this technology has been best demonstrated at limited full scale.

Comment 29 Table 1 – Summary and Evaluation of Ex Situ Treatment Technologies: Vitrification and Thermal Desorption: It is unclear why these technologies are ranked as unlikely. They have been demonstrated in the New York/New Jersey Harbor area and encourage end use application.

Response: See previous response.

Comment 30 Table 1 – Summary and Evaluation of Ex Situ Treatment Technologies: iAOPCs were grouped according to contaminant and analyzed with respect to potential upland disposal and cleanup levels to determine which sediments would require pre-treatment prior to landfill disposal under a removal GRA scenario. This grouping was based on "risk drivers", ultimately using a single risk driver (ie, PCBs) for an iAOPC. The need for treatment may be driven by other contaminants as well (another constituent may be more mobile or have high toxicity as well). The upcoming leaching tests results will provide additional information that should be considered for some of the areas.

Response: We agree to consider the chemical mobility test results in this context for the FS.

Comment 31 Table 2 – Summary and Evaluation of In Situ Treatment Technologies: With the exception of enhanced cap materials, in-situ treatment technologies are all rated as unlikely or highly unlikely. EPA acknowledges that effective in-situ treatment options are currently limited. However, there may be some opportunities at specific locations within Portland Harbor where in-situ treatment technologies could be effective, and they should not be screened out as this stage. The results of ongoing pilot scale work, like the activated carbon pilot projects at the Grasse River (Alcoa), marine sediments in Trondheim Harbor, Norway, and tidal mudflats in San Francisco Bay, should be considered as it becomes available and included as appropriate during the FS. The pilot

projects are evaluating different engineering methods of application of activated carbon to PCB-impacted sediments to alter sediment geochemistry and bioavailability of PCBs to benthic organisms.

Response: We will reevaluate our assessment of these technologies in the AETT document to the extent that new information is available. We also agree to reevaluate these technologies in the FS if new information becomes available between now and the FS evaluation.